

## EOCEP Algebra 1/Mathematics for the Technologies 2

### 2015 Data Review

1. Four functions were graphed. The student was asked which function has a domain  $> 0$ ?
    - a) 19% chose the correct response.
    - b) 54% chose a function with a positive slope.
  2. A verbal description of a function was given, with both variables described, but not defined as dependent or independent. If one of the variables changes, how will the graph change?
    - a) Choices included increase in slope, decrease in slope, change in one of the intercepts, and no change.
    - b) 60% chose the correct option.
    - c) 28% chose an incorrect option which had a positive pBis. This indicates that students who did well on the test tended to miss this question (unexpected).
    - d) Other incorrect options had negative pBis (expected)
  3. A verbal statement is made describing a function: Some number,  $x$ , is  $A$  less than  $B$  times  $y$ . ( $A$  and  $B$  are given verbally, as opposed to numerically.) Which could be the equation?
    - a) 62% answered correctly.
    - b) 26% reversed the subtraction.
- Note: This needs to be addressed in instruction. Many students hear “three less than five” and write “3-5” because they want the verbal order to be the mathematical order.
4. The student was asked to solve an inequality (one variable) with a negative in front of the variable.
    - a) 29% solved it correctly EXCEPT they forgot to reverse the inequality.
    - b) 43% solved it correctly.
  5. A graph is shown. The student is asked for the domain.
    - a) 56% got it correct.
    - b) 32% gave the range.
  6. Students were asked to simplify an equation with a negative coefficient in front of parentheses.
    - a) 58% got it correct.
    - b) Distributing a negative in front of a set of parentheses continues to be a problem.
  7. Another item dealt with simplifying an equation, this one had 2 sets of parentheses and a negative (no coefficient visible) in front of one of the parentheses and subtraction inside the parentheses.
    - a) 52% got this one correct.
    - b) Distributing a negative in front of a set of parentheses continues to be a problem.
  8. A simple three-variable formula is given. Students are asked to identify an equivalent relationship.
    - a) For example, the given might be  $a=bc$ , or  $a=b+c$ , or  $a=b-c$ , or  $a=b/c$ . Identifying the correct option required solving for a variable other than  $a$ .
    - b) 61% got this one correct.

9. The student is asked to evaluate a quadratic function for  $f$  of a negative number. For example,  $f(x) = ax^2 - bx + c$ , find  $f(-2)$
- a) 49% got it correct
  - b) 25% got the answer you get when you just type the numbers in a calculator. (The calculator did not apply the negative to  $x^2$  properly.)
10. The student is asked to factor a quadratic function. All coefficients were integers less than or equal to 15.
- a) 47% got it correct.
11. Given a quadratic function, the student is told that it has 2  $x$ -intercepts. The student is asked to identify the axis of symmetry.
- a) 28% gave one of the  $x$ -intercepts as the axis of symmetry.
  - b) 52% got it correct.
12. The student is given an absolute value function and is asked to identify the graph of that function.
- a) Options include discrete points, multiple line segments, a line and the correct graph.
  - b) 36% got it correct.
  - c) 50% chose the line.
13. The student is asked which option shows correct multiplication. In each option, the base is a variable with rational exponents and exponents were unit fractions.
- a) 62% got this correct
14. Given a verbal description of a two-variable situation and an equation that models the situation, students are asked what the coefficient means.
- a) 27% said the coefficient represented the same value that the verbal description defined as one of the variables.
  - b) 55% got it correct.
15. Given a graph of a function and a table of values for a different function, students were asked to compare the two functions.
- a) Options asked "...greater slope,  $x$ -intercept,  $y$ -intercept, or value at a given point."
  - b) 55% got it correct.

Note: If students plotted the points in the table, they could simply look at the graph and answer the question.

16. Given an equation for a linear function with a negative fractional coefficient and given three numbers from the domain, the student was asked for the range at those three points.
- a) 29% ignored the negative in front of the fraction.
  - b) 49% got it correct.
17. Students were asked for the best scale for a graph to represent a situation given verbally.
- a) 40% of the students ignored the fact that the units shown in the graph were not used in the verbal description.
  - b) 38% got it correct.

18. Student were given a quadratic function and asked for the equivalent equation. Finding this form of the equation required completing the square. All coefficients in the quadratic function were integers less than 12.  
54% got it correct.
19. Given a variable with a rational exponent, the student was asked to identify an equivalent expression. The correct option can be obtained by simply using the definition of rational exponents.  
a) 43% answered correctly.  
b) 40% just put the variable in the numerator and denominator of a fraction, applying the two parts of the exponents to each. (eg.  $M^{4/5} = M^4/M^5$ )
20. Students were asked to simplify a fraction in which the numerator and denominator each had a fractional exponent.  
a) 45% simplified correctly by subtracting exponents.  
b) 15% multiplied exponents.  
c) 21% added exponents.  
d) 19% divided exponents.
21. A function is described verbally. The student is asked if the function is linear, quadratic, exponential or constant.  
a) 54% got it correct.
22. The student was given an expression involving rational and/or irrational numbers. Choosing the correct option involved understanding rational/irrational closure over addition and multiplication  
a) Only 51% got this correct.
23. A situation with a repeated multiplier was described verbally. Students were asked to match the situation with a graph.  
a) 53% thought this was linear.  
b) 41% saw it correctly as exponential.
24. A scatter plot was given. Students were asked to identify the equation that most accurately represented the scatter plot. In the example, the slope and y-intercept are fractional.  
45% answered correctly.

Note: Students should have been able to visually rule out 2 options because the y-intercept was too high, but 30% chose one of those two options.

25. Students were given a linear inequality and asked to identify the graph that represents the inequality.  
a) 53% got it correct.  
b) 26% chose a slope with the wrong sign.  
c) 21% shaded the wrong side of the correct line.

26. Given a quadratic function and two  $x$  values students were asked to find the average rate of change between those  $x$  values. To answer this, students must find the  $y$  values and then calculate slope.
- a) 23% got it correct.
  - b) 28% just subtracted the  $x$ -values.
  - c) 30% just subtracted the  $y$  values.
27. This item addressed finding the average rate of change. Students were given the graph of a “squiggly” curve. The  $x$ -values of points A, B, and C are given. Students are asked to compare the rate of change between A and B with the rate of change between B and C. To answer this one, students must look at the graph to estimate the corresponding  $y$ -values and then find the slope or they must estimate the rate of change between the points.
- 28% got this one correct.
28. A parabola,  $f(x)$ , is graphed. A second function,  $g(x)$  is said to be linear but is not graphed. Two solutions to  $f(x) = g(x)$  are given. The student is asked to find the equation of  $g(x)$ .
- a) 25% got this one correct.
  - b) 46% just used the two values given as the solutions as the coefficient and constant in the equation.
29. A function is described; the student is asked to describe the domain. Options included such choices as real, integers, whole, etc.
- 19% got this one correct.
30. A situation with unit income, unit cost, and set-up fee is given. Students are asked to write an equation.
- a) 11% got this one correct!
  - b) 42% combined the set-up cost with the unit cost without considering the number of units (just added the two numbers).
  - c) 36% added the unit cost to the unit income.